CLAIMS

1. A light-emitting device comprising at least a light-emitting layer on a substrate, wherein a mode conversion means for converting a waveguide mode to a radiation mode is arranged in at least one of the interior of the substrate, the interior of the light-emitting layer, the boundary between the substrate and the exterior, the boundary between the substrate and the light-emitting layer and the boundary between the light-emitting layer and the exterior.

2. A light-emitting device comprising at least a light-emitting layer and one or more waveguide layers on a substrate, wherein a mode conversion means for converting a waveguide mode to a radiation mode is arranged in at least one of the interior of the substrate, the interior of the light-emitting layer, the interior of the waveguide layer, the boundary between the substrate and the exterior of the substrate, the boundary between the substrate and the light-emitting layer, the boundary between the light-emitting layer and the exterior of the light-emitting layer, the boundary between the substrate and the waveguide layer, the boundary between the light-emitting layer and the waveguide layer, the boundary between the waveguide layer and the exterior of the waveguide layer and the boundary between the waveguide layer and the waveguide layer.

3. An organic EL light-emitting device comprising at least a first electrode, an organic EL layer and a second electrode opposed to the first electrode, arranged in that order on a substrate, wherein a mode conversion means for converting a waveguide mode to a radiation mode is arranged in at least one of the interior of the substrate, the interior of the first electrode, the interior of the organic EL layer, the interior of the second electrode, the boundary between the substrate and the exterior of the substrate, the boundary between the

substrate and the first electrode, the boundary between the first electrode and the organic EL layer, the boundary between the organic EL layer and the second electrode and the boundary between the second electrode and the exterior of the second electrode.

4. The organic EL light-emitting device according to claim 3, wherein the second electrode is a transparent electrode, a thin film metal electrode or an electrode comrpised of a transparent electrode and a thin film metal arranged on the side of the transparent electrode nearer to the organic EL layer.

5. The organic EL light-emitting device according to claim 3, comprising an optical function layer having the mode conversion means for converting the waveguide mode to the radiation mode on the outer surface of the substrate or the outer surface of the second electrode.

6. An organic EL light-emitting device comprising at least a first electrode, an organic EL layer and a second electrode opposed to the first electrode, arranged in that order on a substrate, wherein at least one waveguide layer is arranged on the substrate, wherein a mode conversion means for converting the waveguide mode to the radiation mode is arranged in at least one of the interior of the substrate, the interior of the first electrode, the interior of the organic EL layer, the interior of the second electrode, the interior of the waveguide layer, the boundary between the substrate and the exterior of the substrate, the boundary between the substrate and the first electrode, the boundary between the first electrode and the organic EL layer, the boundary between the organic EL layer and the second electrode, the boundary between the second electrode and the exterior of the second electrode, the boundary between the substrate and the waveguide layer, the boundary between the first electrode and the waveguide layer, the boundary between the organic EL layer and the waveguide layer, the

boundary between the second electrode and the waveguide layer, the boundary between the waveguide layer and the exterior of the waveguide layer and the waveguide layer and the waveguide layer.

7. The organic EL light-emitting device according to claim 6, wherein the second electrode is a transparent electrode, a thin film metal electrode or an electrode comrpised of a transparent electrode and a thin film metal arranged on the side of the transparent electrode nearer to the organic EL layer. 8. An organic EL light-emitting device comprising at least a first electrode, an organic EL layer, a translucent second electrode opposed to the first electrode and a protective film, arranged in that order on a substrate, wherein a mode conversion means for converting a waveguide mode to a radiation mode is arranged in at least one of the interior of the substrate, the interior of the first electrode, the interior of the organic EL layer, the interior of the second electrode, the interior of the protective film, the boundary between the substrate and the exterior of the substrate, the boundary between the substrate and the first electrode, the boundary between the first electrode and the organic EL layer, the boundary between the organic EL layer and the second electrode, the boundary between the second electrode and the protective film, and the boundary between the protective film and the exterior of the protective film.

9. The organic EL light-emitting device according to claim 8, comprising an optical function layer having the mode conversion means for converting the waveguide mode to the radiation mode on the outer surface of the substrate or the outer surface of the protective film.

10. An organic EL light-emitting device comprising at least a first electrode, an organic EL layer, a translucent second electrode opposed to the first electrode and a protective film, arranged in that order on a substrate, wherein at least one waveguide layer is formed

on the substrate, and wherein a mode conversion means for converting a waveguide mode to a radiation mode is arranged in at least one of the interior of the substrate, the interior of the first electrode, the interior of the organic EL layer, the interior of the second electrode, the interior of the protective film, the interior of the waveguide layer, the boundary between the substrate and the exterior of the substrate, the boundary between the substrate and the first electrode, the boundary between the first electrode and the organic EL layer, the boundary between the organic EL layer and the second electrode, the boundary between the second electrode and the protective film, the boundary between the protective film and the exterior of the protective film, the boundary between the substrate and the waveguide layer, the boundary between the first electrode and the waveguide layer, the boundary between the organic EL layer and the waveguide layer, the boundary between the second electrode and the waveguide layer, the boundary between the protective film and the waveguide layer, the boundary between the waveguide layer and the exterior of the waveguide layer and the boundary between the waveguide layer and the waveguide layer.

11. An organic EL light-emitting device comprising at least a transparent electrode, an organic EL layer and a metal electrode opposed to the transparent electrode, arranged in that order on a transparent substrate, wherein a mode conversion means for converting a waveguide mode to a radiation mode is arranged in at least one of the interior of the transparent substrate, the interior of the transparent electrode, the interior of the organic EL layer, the interior of the metal electrode, the boundary between the transparent substrate and the exterior of the transparent substrate, the boundary between the transparent substrate and the transparent electrode, the boundary between the

transparent electrode and the organic EL layer, the boundary between the organic EL layer and the metal electrode and the boundary between the metal electrode and the exterior of the metal electrode.

12. The organic EL light-emitting device according to claim 11, comprising an optical function layer having the mode conversion means for converting the waveguide mode to the radiation mode on the outer surface of the transparent substrate or the outer surface of the metal electrode.

13. An organic EL light-emitting device comprising at least a transparent electrode, an organic EL layer and a metal electrode opposed to the transparent electrode, arranged in that order on a transparent substrate, wherein at least one waveguide layer is formed on the transparent substrate, and wherein a mode conversion means for converting a waveguide mode to a radiation mode is arranged in at least one of the interior of the transparent substrate, the interior of the transparent electrode, the interior of the organic EL layer, the interior of the metal electrode, the interior of the waveguide layer, the boundary between the transparent substrate and the exterior of the transparent substrate, the boundary between the transparent substrate and the transparent electrode, the boundary between the transparent electrode and the organic EL layer, the boundary between the organic EL layer and the metal electrode, the boundary between the metal electrode and the exterior of the metal electrode, the boundary between the transparent substrate and the waveguide layer, the boundary between the transparent electrode and the waveguide layer, the boundary between the organic EL layer and the waveguide layer, the boundary between the metal electrode and the waveguide layer, the boundary between the waveguide layer and the exterior of the waveguide layer and the boundary between the waveguide layer and the waveguide layer.

14. An organic EL light-emitting device according to any one of claims 3 to 13, wherein the mode conversion means is an optical structure having a regularity of a refractive index distribution in one-dimensional, two-dimensional or three-dimensional direction.

15. The organic EL light-emitting device according to claim 14, wherein the regularity is a period of an effective wavelength degree of the light emitted from the organic EL layer.

16. The organic EL light-emitting device according to claim 14, comprising two or more mode conversion means having the regularity of the same period.

17. The organic EL light-emitting device according to claim 14, wherein the regularity has a fluctuation of not more than one fourth of the period of an effective wavelength degree of the light emitted from the organic EL layer.

18. The organic EL light-emitting device according to claim 17, wherein the mode conversion means has at least two optical structures with the regularity of the refractive index distribution in the two-dimensional direction, and the regularity of the optical structures has a different period within the fluctuation range for each optical structure.

19. The organic EL light-emitting device according to claim 18, wherein the two or more optical structures are formed in the same two-dimensional plane.

20. The organic EL light-emitting device according to claim 14, wherein the regularity is such that a period of an effective wavelength degree of the light emitted from the organic EL layer coexists with a fluctuation of not more than one fourth of the period of the effective wavelength degree.

21. The organic EL light-emitting device according to claim 14,

wherein the period of the regularity changes gradually.

22. The organic EL light-emitting device according to claim 14, wherein the regularity of the refractive index distribution in the two-dimensional direction is a tetragonal lattice arrangement, a triangular lattice arrangement, a honeycomb lattice arrangement, an arrangement which can fill up a plane with a finite number of unit elements or any combination thereof.

23. The organic EL light-emitting device according to claim 14, wherein the regularity of the refractive index distribution is formed of a material having a higher refractive index than a material lacking the regularity ot the refractive index distribution.

24. The organic EL light-emitting device according to claim 23, wherein the material having a high refractive index is transparent to the light emitted from the organic EL layer.

25. The organic EL light-emitting device according to claim 14, wherein the regularity of the refractive index distribution is formed of a material having a lower refractive index than a material lacking the regularity of the refractive index distribution.

26. The organic EL light-emitting device according to claim 25, wherein the material having a low refractive index is transparent to the light emitted from the organic EL layer.

27. The organic EL light-emitting device according to claim 25, wherein the material having a low refractive index is a gas.

28. The organic EL light-emitting device according to claim 27, wherein the gas is an air or an inert gas.

29. The organic EL light-emitting device according to claim 14, wherein the optical structure arranged in the boundary between the substrate and the exterior of the substrate, the boundary between the substrate and the first electrode, the boundary between the first

electrode and the organic EL layer, the boundary between the organic EL layer and the second electrode and the boundary between the second electrode and the exterior of the second electrode is formed of an unevenness of the boundary having the regularity in the one-dimensional or two-dimensional direction.

30. The organic EL light-emitting device according to claim 14, wherein the optical structured arranged in the boundary between the substrate and the exterior of the substrate, the boundary between the substrate and the first electrode, the boundary between the first electrode and the organic EL layer, the boundary between the organic EL layer and the second electrode, the boundary between the second electrode and the exterior of the second electrode, the boundary between the substrate and the waveguide layer, the boundary between the first electrode and the waveguide layer, the boundary between the organic EL layer and the waveguide layer, the boundary between the second electrode and the waveguide layer, the boundary between the waveguide layer and the exterior of the waveguide layer and the boundary between the waveguide layer and the waveguide layer is formed of an unevenness of the boundary having the regularity in the one-dimensional or two-dimensional direction.

31. The organic EL light-emitting device according to claim 14, wherein the optical structure arranged in the boundary between the transparent substrate and the exterior of the transparent substrate, the boundary between the transparent substrate and the transparent electrode, the boundary between the transparent electrode and the organic EL layer, the boundary between the organic EL layer and the metal electrode and the boundary between the metal electrode and the exterior of the metal electrode is formed of an unevenness of the boundary having the regularity in the one-dimensional or two-dimensional

direction.

32. The organic EL light-emitting device according to claim 14, wherein the optical structure arranged in the boundary between the transparent substrate and the exterior of the transparent substrate, the boundary between the transparent substrate and the transparent electrode, the boundary between the transparent electrode and the organic EL layer, the boundary between the organic EL layer and the metal electrode, the boundary between the metal electrode and the exterior of the metal electrode, the boundary between the transparent substrate and the waveguide layer, the boundary between the transparent electrode and the waveguide layer, the boundary between the organic EL layer and the waveguide layer, the boundary between the metal electrode and the waveguide layer, the boundary between the waveguide layer and the exterior of the waveguide layer and the boundary between the waveguide layer and the waveguide layer is formed of an unevenness of the boundary having the regularity in the one-dimensional or two-dimensional direction.

33. The organic EL light-emitting device according to claim 14, wherein the organic EL layer has a different emitted light wavelength depending on area.

34. The organic EL light-emitting device according to claim 33, wherein the conversion means is the optical structure having the regularity of the refractive index distribution in the one-dimensional, two-dimensional or three-dimensional direction corresponding to the different emitted light wavelength.